

E=mc² & Nuclear Physics

1. What prevents the nucleus of a helium atom from flying apart?
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2. The nuclear force that holds nucleons together is

- 1) weak and short range
- 2) weak and long range
- 3) strong and short range
- 4) strong and long range

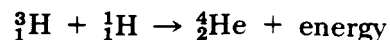
3. The chart below lists the rest masses of two particles and a nucleus in atomic mass units

proton	1.0073 u
neutron	1.0087 u
${}^6_3\text{Li}$ nucleus	6.0135 u

What is the mass defect of a ${}^6_3\text{Li}$ nucleus?

- 1) 0.0345 u
- 2) 0.0615 u
- 3) 3.0606 u
- 4) 3.9975 u

Base your answers to questions 4 through 7 on the information below which represents a nuclear reaction.



The masses of the nuclei are:

$${}^1_1\text{H} = 1.00813 \text{ u (amu)}$$

$${}^3_1\text{H} = 3.01695 \text{ u (amu)}$$

$${}^4_2\text{He} = 4.00388 \text{ u (amu)}$$

4. This reaction is an example of

- 1) fusion
- 2) fission
- 3) beta decay
- 4) alpha decay

5. The symbols, ${}^3_1\text{H}$ and ${}^1_1\text{H}$ represent

- 1) electrons
- 2) deuterium ions
- 3) isotopes
- 4) alpha particles

6. Which occurs as a result of this reaction?

- 1) Matter is converted into energy.
- 2) Energy is converted into matter.
- 3) Mass and energy are destroyed.
- 4) Mass and energy are created.

7. How much energy is released during the reaction?

- 1) 0.021 MeV
 - 2) 2.00 MeV
 - 3) 30.0×10^{-19} MeV
 - 4) 19.7 MeV
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8. Base your answer to the following question on the information in the chart below.

Particle	Rest Mass
proton	1.0073 u
neutron	1.0087 u

The energy equivalent of the rest mass of a proton is approximately

- 1) 9.4×10^2 MeV
- 2) 1.9×10^3 MeV
- 3) 9.1×10^{16} MeV
- 4) 6.4×10^{18} MeV

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Answer Key

1. The strong force or the strong nuclear force prevents the nucleus of a helium atom from flying apart.

2. 3

3. 1

4. 1

5. 3

6. 1

7. 4

8. 1
